TEXAS HIGHWAY DEPARTMENT

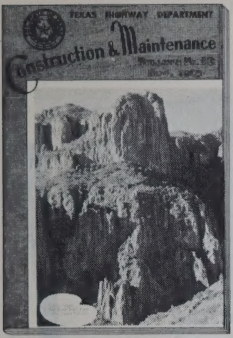
Construction & Maintenance

BULLETIN No. 26

Aug. 1953

Rocky Slopes
Big Bend Nat'l Park
Texas Highway Dept. photo

About the Cover . . .



On the cover, C&M takes a look through Pulliam Canyon at one of the many peaks which rise majestically in Big Bend National Park. The park, which contains almost 800,000 acres, was established in 1944. To make it accessible, we have constructed 40 miles of highway from Marathon to the park entrance and will complete another highway this summer from Alpine, making a total of 120 miles of paved highway built to accommodate the desire of the traveling public to visit this attraction. These roads to Big Bend National Park cost $1 1/3 million and will pay for themselves within five years in terms of recreational travel to and within Texas. Roads within the park are constructed and maintained by the National Parks Service, Department of Interior.

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Construction and Maintenance Bulletin

The purpose of the *Construction & Maintenance Bulletin* is to furnish a medium for presenting practical information applicable to current highway problems. These conclusions and data are not necessarily endorsed by the Highway Department nor are they to be construed as instructions. Employees are invited and urged to submit suggestions and relate experiences which would benefit those engaged in the construction and maintenance of highways.

Photographic services are available and other assistance may be obtained, if desired, in preparing material for submission. All material and comments should be directed to the Chief Engineer, Construction and Maintenance, Austin 14, Texas.

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PUBLISHED JOINTLY BY

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COMPILED AND EDITED
Traffic Services Division, INFORMATION SECTION

REPRODUCED
Operations Division, REPRODUCTION SECTION

As We See It

The average employee of the Department is much better off—than 30 years ago or less. Wages and other forms of pay have almost tripled in 30 years. Living cost prices have less-than-doubled . . . so there's a margin.

Time was when a Resident Engineer was hired for one job only and found his next job himself. A retirement program in the late thirties was just a pipe dream . . . compensation insurance was not for us until 1938.

Vacation and sick leave were enjoyed only by the few monthly paid employees. Working all day Saturday was the rule rather than the exception.

All equipment was manually operated . . . open cabs were standard on all equipment as late as 1936 . . . cab heaters didn't show up in our trucks until the early forties.

Improvement is the basic law of life. Things *have* improved in the past, the long pull past. What we think and do today makes a lot of difference on tomorrow. We cannot stop the improvement, but we can hold it back or speed it up. To speed it up requires more than noble wishes or grousing. It takes hard knowledge, judgment, savvy, and most of all hard work.

Sounds elementary, but it works.

Sod Edger Machine

J.M. York, Assistant District Engineer
District 11

Following is a description of the machine made in our District Shop for edging curbs. In our opinion this machine is much more efficient than methods previously used. The small machines on the market for this work are too light to stand up where any appreciable amount of work is to be done, and the cost if done by hand labor, is prohibitive.

The Edging Machine is mounted on a Ford Tractor by extending the frame approximately two feet forward. A piece of railroad rail four feet long was bolted to the extended frame on the tractor, and an old scarifier tooth one and three-fourths by one and three-fourths-inch square was welded to the flange of the rail, extending six inches past the end of the rail.

A box was made of angle iron six inches long to fit the scarifier tooth with enough clearance allowed for it to slide back and forth. A hook was welded on the top side of the box and a spring attached to hold the cutting blade against the back of the curb.

A bracket fourteen inches long made of four-inch angle iron was welded to the sliding box with a seven-eighths-inch hole at the top to attach the link assembly.

An old discarded caterpillar maintainer link assembly and link (Number 3B5044 and 4B7043), cut off to fourteen inches, is used to lower and raise the cutting blade and colter to the desired depth of cut.

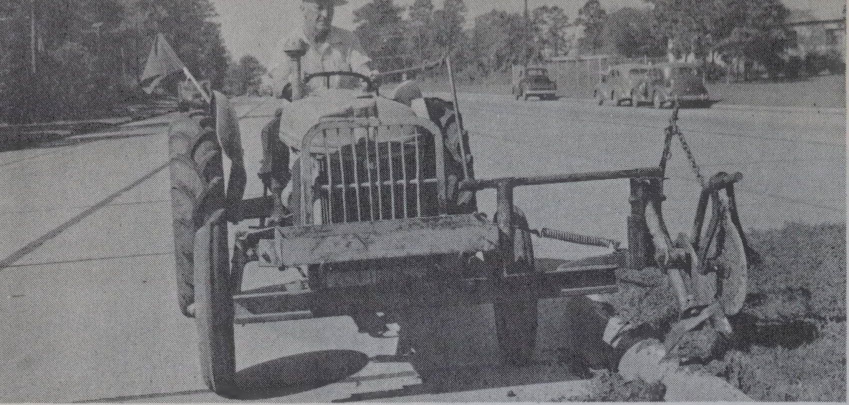
A section of four-inch angle iron was welded six inches from the point of an old 21-inch grader blade and drilled to fit the end of the adjustable link assembly. A three-eighths-by-two-inch wing was welded to the four-inch angle on the blade to shed the dirt and grass from the top of curb.

Four five-eighths-inch holes are drilled at the top of the blade to hold the arm that is attached to the cutting colter and is fastened with two U-bolts for side adjustment. The cutting colter is fourteen inches in diameter and is full floating on the one and one-fourth-inch rod which has four one-fourth-inch holes at the lower end for depth adjustment.

The blade, colter, and arm assembly can be raised as a unit by the operator at any time.

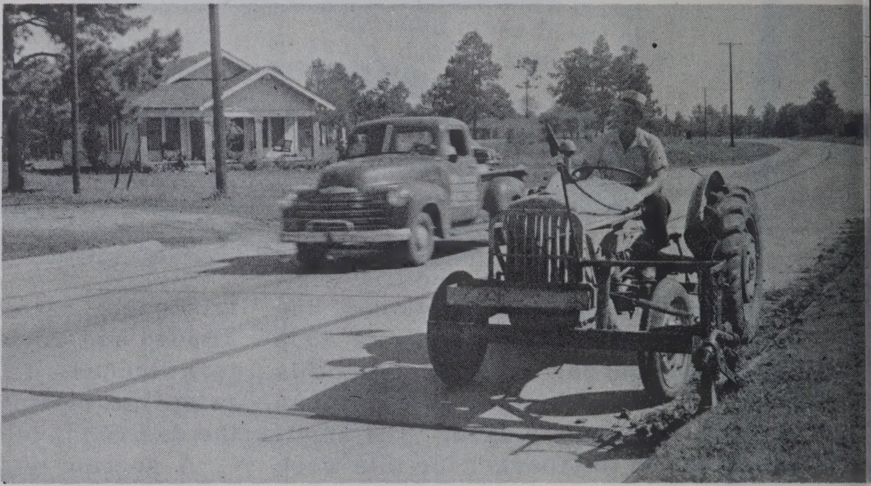
This unit can operate at a speed of three or four miles an hour.

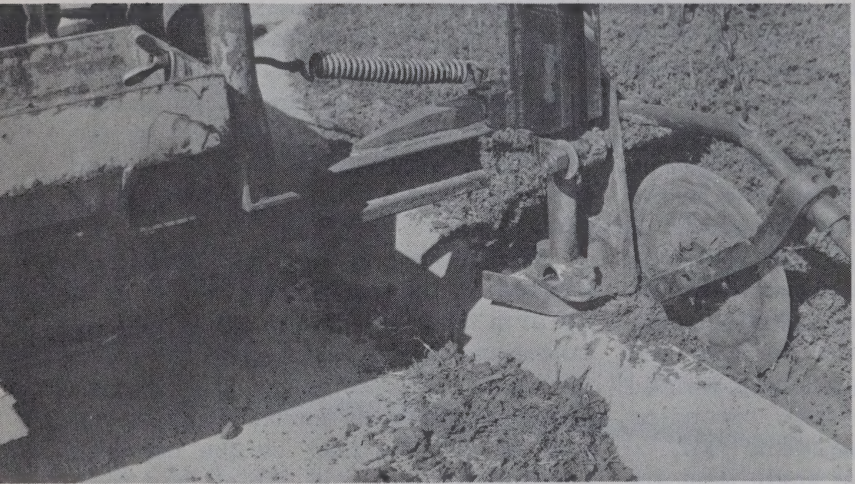
This attachment was designed and built by three men, L. H. Hubbert, Equipment Supervisor; Tom Lashley, Shop Foreman; and L. R. Nail, Blacksmith.



This machine was built to trim sod behind the curb of medians in the vicinity of Lufkin. It does the job in one pass, at an operating speed of three to four miles per hour.

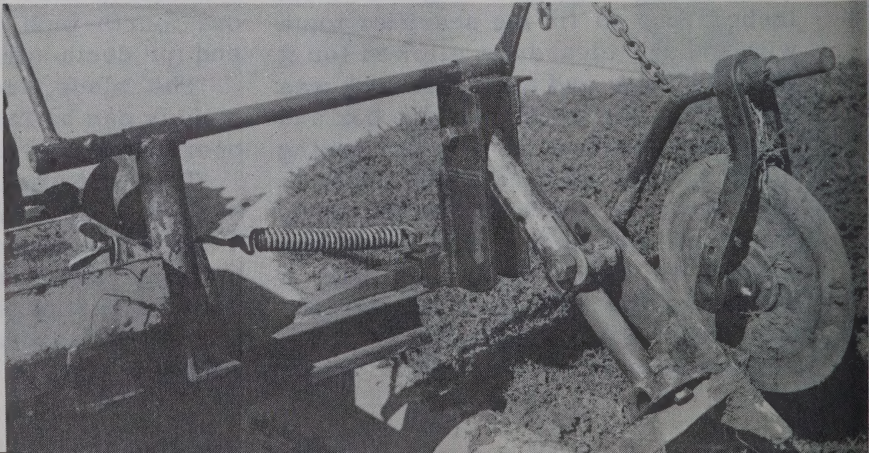
L.H. Hubbert, Equipment Supervisor, is showing how the cutter can be raised and lowered by the operator.





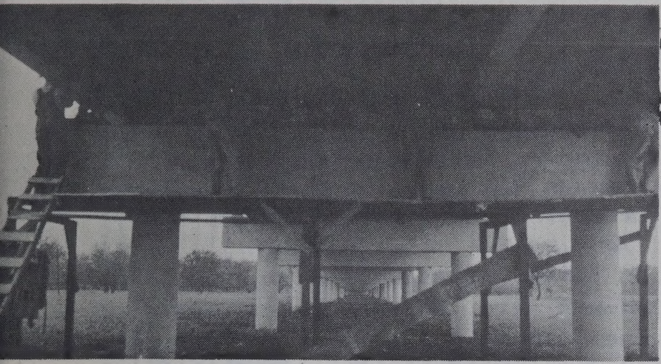
The cutter is in working position. The spring keeps the cutter against the curb.

The cutter is in a raised position. The heavy construction enables this cutter to stand up under heavy work.



BRIDGE REPAIRS

Grover Green, District Maintenance Engineer
District 18
and
Archie Sherrod, Senior Maintenance Bridge Engineer
Maintenance Division

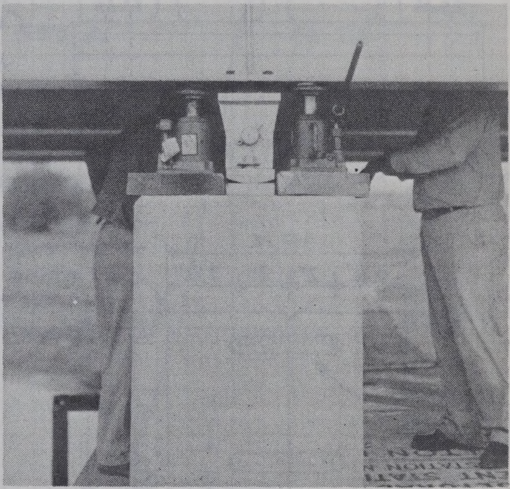


Raising the beam and slab at bent 17.

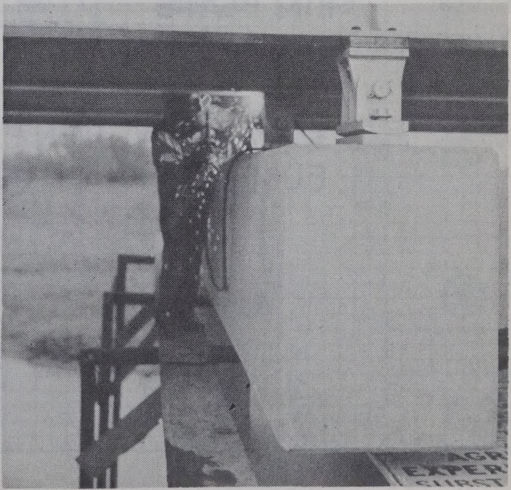
During April, 1953, it was decided that settlement of Bent Number 17 of the East Relief Elm Fork Trinity River Bridge on State Highway 121, Denton County, had reached a point where it was desirable to raise the span back to grade to prevent damage to the 200-foot continuous I-beam unit (50' -50' -50' -50'). The unit spans from Bent Number 14 to Bent Number 18.

The curb on the north side of the bridge at Bent Number 17 had settled 2 inches, and on the south side it was 1 7/16 inches low. The original bolts fastening the I-beams and shoes together were replaced with longer bolts, and on April 23, the span was raised with eight 25-ton hydraulic jacks. Slotted shim plates 2 inches, 1 13/16 inches, 1 5/8 inches, and 1 7/16 inches thick were inserted between the top of the shoes and bottom flanges of the four I-beams. The jacks were then released, the bolts tightened, and the two halves of each shim plate welded together.

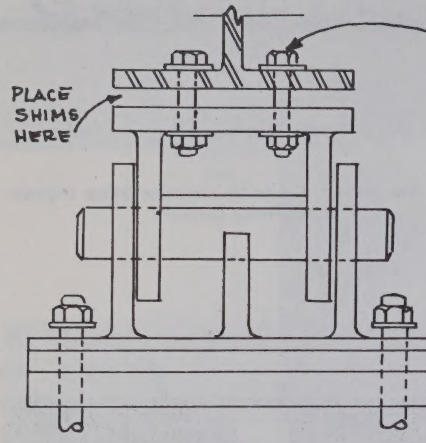
The work was done by the Denton County Maintenance Crew. J. C. Ashby was Maintenance Foreman, and the pictures were taken by W. B. Purcell, General Foreman.



Beams and slabs are raised and ready for placing shims.



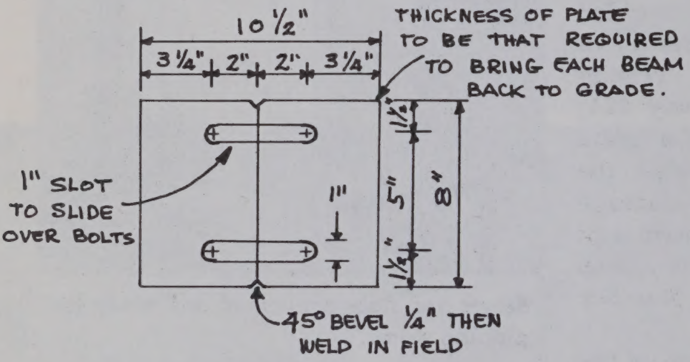
Shim plates tack welded in place.



SIDE VIEW

SUGGESTED PROCEDURE

1. DETERMINE LENGTH OF BOLTS REQUIRED TO ALLOW EACH BEAM TO BE RAISED TO PROPER GRADE, AND WHERE NEEDED REPLACE ORIGINAL BOLTS ONE AT A TIME.
2. RAISE BEAMS WITH A JACK ON EITHER SIDE OF THE SHOES BETWEEN THE CAP AND BOTTOM FLANGES OF BEAMS TO SLIGHTLY ABOVE GRADE IN ORDER TO ADMIT SHIM PLATES (USE A SPREADER SHIM ON TOP OF JACK TO PREVENT DAMAGE TO BOTTOM FLANGES.)
3. SLIDE PLATES IN FROM EITHER SIDE OF SHOE AND TACK WELD THE TWO HALVES OF SHIM PLATE TOGETHER AFTER RELEASING JACKS SETTING LOAD BACK ON SHOES.



THICKNESS OF PLATE TO BE THAT REQUIRED TO BRING EACH BEAM BACK TO GRADE.

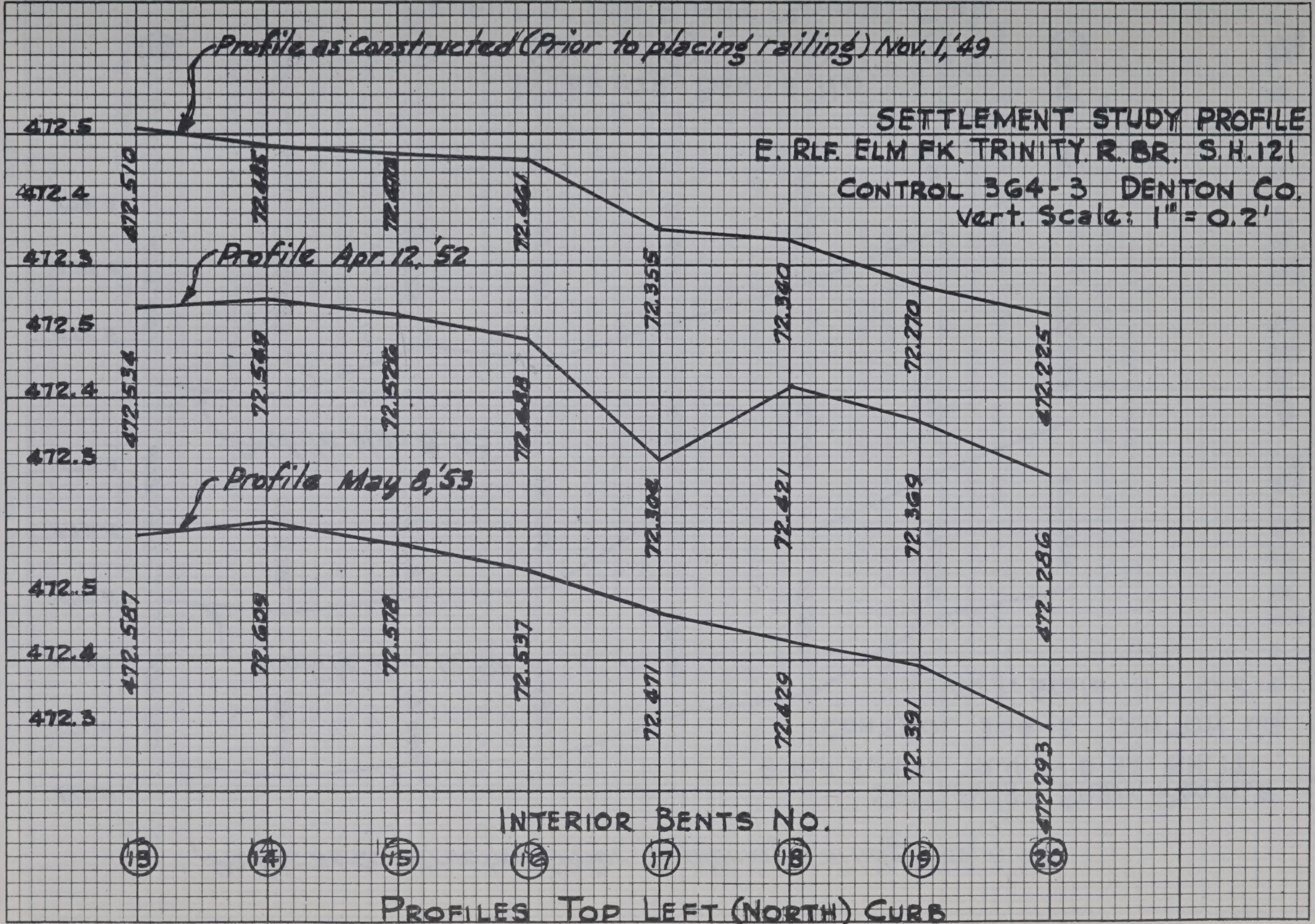
1" SLOT TO SLIDE OVER BOLTS

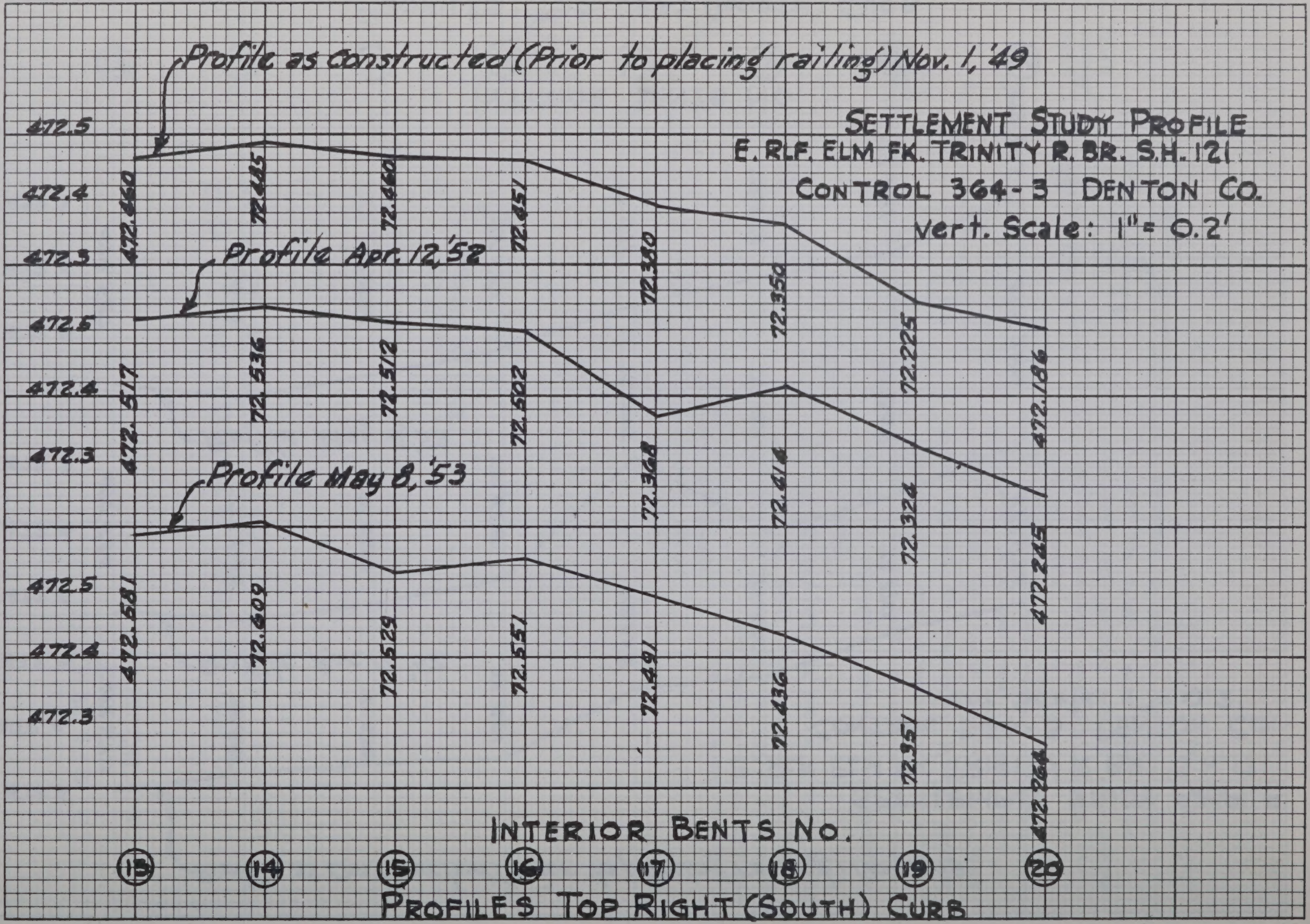
45° BEVEL 1/4" THEN WELD IN FIELD

PLAN VIEW OF SHIM PLATE

REPAIRS AT BENT 17 EAST RELIEF ELM FORK TRINITY RIVER BRIDGE

DENTON Co.
S.H. 121
C-364-3


SETTLEMENT STUDY PROFILE
E. RLF. ELM FK. TRINITY R. BR. S.H. 121
CONTROL 364-3 DENTON CO.
Vert. Scale: 1" = 0.2'
Profile as Constructed (Prior to placing railing) Nov. 1, '49
Profile Apr. 12, '52
Profile May 8, '53
472.5
472.4
472.3
472.5
472.4
472.3
472.5
472.4
472.3
472.510
72.485
72.470
72.461
72.355
72.340
72.270
472.225
472.534
72.549
72.526
72.488
72.304
72.421
72.369
472.286
472.587
72.609
72.578
72.537
72.471
72.429
72.391
472.293
INTERIOR BENTS NO.
⑬
⑭
⑮
⑯
⑰
⑱
⑲
⑳
PROFILES TOP LEFT (NORTH) CURB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472.5
472.4
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72.460
72.451
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472.186
Profile Apr. 12, '52
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72.414
72.324
472.245
Profile May 8, '53
472.5
472.4
472.3
472.581
72.609
72.529
72.551
72.491
72.436
72.351
472.264
INTERIOR BENTS No.
13
14
15
16
17
18
19
20
PROFILES TOP RIGHT (SOUTH) CURB

Acts of the 53rd...

C&M felt that a condensation of SB 175, SB 326, and HB 43 would be of particular interest and concern to its readers.

Senate Bill 175 by Sadler. This Act authorizes the Highway Commission to dispose of any real property or interests therein, heretofore or hereafter acquired by the State for highway purposes and which is no longer needed for such purposes. It prescribes the manner in which such property shall be disposed of, and establishes certain priorities for abutting or adjoining owners, original grantors, et cetera, for the purchase or recovery of such lands. Effective August 26, 1953.

Senate Bill 326 by Martin. This Act makes it unlawful for any person to tamper with, remove, damage or destroy any barricade placed upon any street, road, or highway by the State Highway Department or any political subdivision, or by any contractor or subcontractor, doing road, street or highway construction or repair work under or by the authority of the Highway Department, or any political subdivision. It also makes it unlawful, and prescribes a penalty for any person to disobey the instructions, signals, warnings or markings of any road sign placed upon any street, highway or road as above provided, unless at the time otherwise directed by a police officer. The provisions of this Act do not apply to employees of the Highway Department or any political subdivision of the State, or to any contractor or subcontractor, or to any person whose proper and lawful duties make it necessary for them to go beyond or around any barricades and to enter upon any portion of a street, road or highway which is under construction or in the process of being repaired. Effective June 4, 1953.

House Bill 43 by Smith of Tarrant. This Act adds several new sections to the Uniform Traffic Code. The effect of the Act is to prohibit incorporated cities having a population of less than 2,500 in counties having a population of 250,000 or more from erecting and maintaining traffic signals and signs on state designated highways in such cities without the approval of the Highway Commission, where the cost of the highway has been paid in whole or in part by the Commission. It also gives to the Commission authority to speed zone state highways in the Corporate limits of cities and towns upon its own initiative, or upon the request of any city or town, or any citizen of the State.

The Act also requires the Highway Department to act upon the written application of any city for approval of the installation and operation of traffic signals or signs within 90 days after such application is filed with this Department. Effective August 26, 1953.

Attention is directed to the provisions of this Bill which limit its application to cities and towns of less than 2,500 population (latest preceding Federal Census) located in counties having 250,000 or more population according to the last Federal Census. These provisions restrict the application of the Bill to Bexar, Dallas, Harris, and Tarrant Counties in Districts 15, 18, 12, and 2 respectively.

Tooling the Engineer

C.C. Cagle, Senior Resident Engineer
District 1

Reference is made to the article by Herbert Eldridge, former Chief Engineer of Planning, entitled "The Personnel Problem," which appeared in Construction and Maintenance Bulletin Number 21. Mr. Eldridge indicates that our rapidly increasing work-load will have to be borne by the forces we now have. This, of course, can only be accomplished through an increase in the productivity of our personnel, and Mr. Eldridge has listed certain administrative "musts" which are essential if such an increase is to be brought about. Two of these, proper tooling and more attention to the personal convenience of the employee, are, I believe, most important and worthy of further consideration.

As we all know, the very life of American industry depends upon good tooling. Every progressive industry is continually studying its tooling, improving it, increasing it. Our Highway Department is a pretty fair sized industry, and should be no exception to this rule - but are we?

We do not hesitate to equip a truck driver with a $3,000 truck. Its fair economic life is, say six years. Thus we spend $500 per year for tools for our truck driver. Or consider the maintainer operator. The motor-grader costs $12,000 and reasonably lasts twelve years. Here, we spend $1,000 per year in tooling our man.

But what about tooling for the engineer in the resident office? What have we done for him? We have given him a small space in a crowded room, a table, a stool or chair, bad light, and very little in the way of conveniences. We find engineers, designers, draftsmen, and others herded together in group-rooms. Each day a series of constant interruptions. Noise, confusion and dust always, and heat throughout the summer. No slightest suggestion that the group warrants respect or consideration. No suggestions that each man is an individual. Little to invite his interest in his work or his pride in it.

Now suppose we change all this, as progressive private industry is rapidly doing. When we plan our new resident office, give each engineer, designer, and draftsman a private office - a small one will do. But make it comfortable and pleasant - well-lighted, air conditioned, and with acoustic ceiling. Furnish it properly. Give the draftsman, for instance, a desk and chair plus his table and stool. Build in a bookcase, coat-locker, and supply cabinet for everyone. Adopt pleasing lines and color. Make the entire office setup convenient and functional. Provide equipment of modern design: drafting tables and stools that are easily adjustable, lettering guide sets, typewriters, calculating machines, a mimeograph or ditto machine, transits and levels with modern improvements for speed, an altimeter of reasonable accuracy. Provide a set of aerial maps of stereoscopic coverage for the assigned area. And provide conveniently equipped station wagons and pickup trucks for survey and inspection work.

True, all this will require an

additional capital investment - so what do we gain? Some of our gain is obvious. For instance, the time saved by means of the aerial maps on one project often more than pays for the whole set of maps. And the altimeter speeds up preliminary surveys and hydraulic investigations. But there are other gains that are just as real. In the private office, our mental worker can concentrate - and so works faster. He is not distracted. He is not interrupted. His books, his drawings, and the other things he works with are handy in desk or cabinet. His air conditioning keeps him cool or warm without his fiddling with windows, fans, or stove. He is free from outdoor noises. And both he and his papers are free from dirt and free from drafts. Can anyone doubt that he'll do more work?

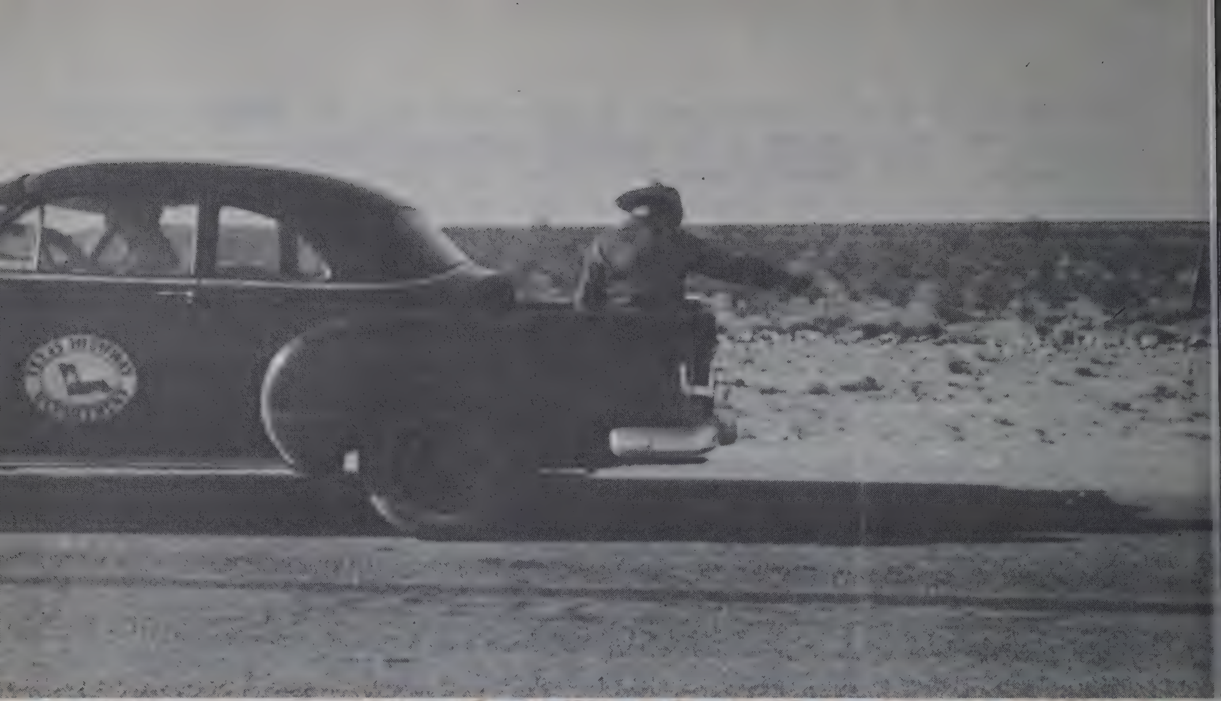
And, of course, when we put a man in a private office, his morale goes up. Way up. He has more interest in his job, and he'll do it better. He has more respect for his work and for himself - and thus will have more respect for his time. He is much less likely to waste it, or to permit others to waste it. His bearing changes, his dress changes, and his attitude changes - almost at once.

Futhermore, there is the important factor of respect by others. When any group of workers are herded into a large room, they lose importance as individuals. Neither they, nor their work, nor their time, are held in proper respect by others. Their time is used without proper consideration. Put them in private offices, and the visitor uses their time with care. Now before dismissing all this as just another pipe dream and a waste of money, let's see what private industry has discovered about it. C. F. Braun & Company, a large engineering and manufacturing firm in Alhambra, California, has tooled its engineering departments in just such a manner. The records of this company show that the cost of such improvements in their Designs Department amounted to about 2 1/2 per cent of the annual payroll of the department - but that the productivity of the section increased 35 per cent. Not a bad return.

Now admittedly, it is hard to break a habit of long standing. So some will oppose this idea of private offices. They will maintain that our personnel work pretty closely together - use the same files - refer to the same drawings. Therefore, they must be in the same room. Those people who repeat this objection to privacy are reminded that each of our private offices will have a door. Then there's another school of thought which says that if mental workers are watched like so many schoolboys, they'll accomplish more work. But can we watch a man think? The fact is that perhaps a mental worker can be watched into looking busy, but that his actual work can be measured only by his interest. Think back over your own classroom days.

The arguments against comfortable facilities merely excuse inertia. The real reasons behind opposition are tradition, habit, and shortsightedness. The word "comfort" is often misunderstood. It is a dangerous term when applied to lighting, heating, cooling, noise reduction, or protection from interruptions. Those not directly affected often define "comfort" as meaning "luxury," and then proceed to ridicule comfort facilities. But "comfort" is, by definition, something that invigorates the body or the mind. And this is precisely the thing we're trying to do.

Our engineering employee is certainly no less essential than our truck driver. His time is not worth less. He already does a lot of work, but we want him to do more work. So let's make it easy for him to do more work. Let's equip him properly. I think it will pay big dividends in increased productivity.



Lime is dropped in low spots at signal from driver. Speed is usually about 50 miles per hour.

Patching With Premix

R. A. Warnock, Senior Maintenance Foreman
District 6

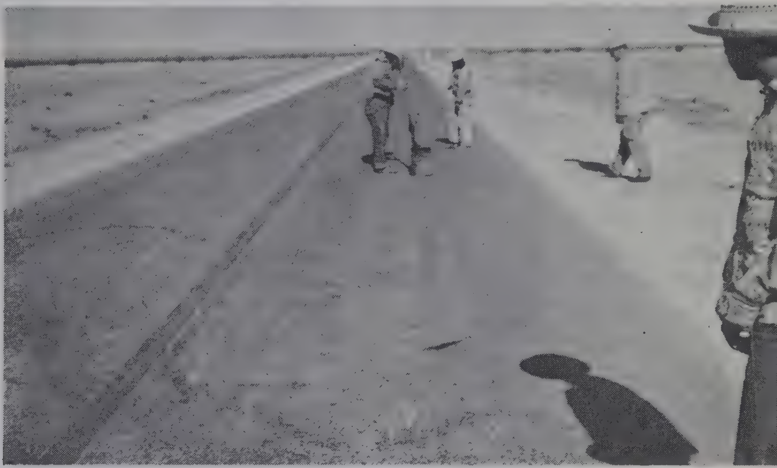
Locating bumps and depressions in dry West Texas is a problem. Several methods have been used, and naturally, the best is marking depressions that hold water after a rain. Since it seldom rains in this area, it has been necessary to develop another method. The Maintenance Foreman drives over the road to be patched at about 50 miles per hour in a coupe-pickup. A man rides in the rear with a bucket of wet lime mixture. When the driver notes a bump or depression, he honks the horn and the man in the rear drops a handful of the lime mixture. The lime will mark the pavement, and the area to be patched is usually about ten to twenty feet behind the lime mark. Since this lime mark will not remain on the pavement very long, one man follows through and makes a more permanent mark with emulsion.

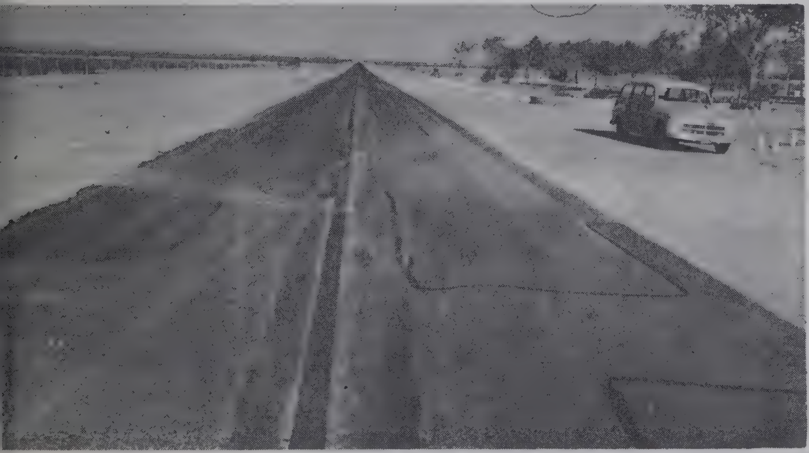
The next step is to outline the area to be patched. The contour of the patch is marked with emulsion as a 60-foot wire stretched parallel to the center line is gradually moved across the pavement. A tack coat of emulsion is applied on the area to be patched. Undiluted emulsion is used in cool weather and a 50-50 dilution with water is used in the summer. After the emulsion has broken, the premix material is placed, leveled, and rolled. We find that a smoother patch can be obtained by using a float after the usual raking and leveling. If a patch is thin and is inclined to ravel around the edges, a coat of emulsion about eight to ten inches wide around the edges of the patch will hold it.

The usual patching crew consists of six men and two trucks. One truck is for barricades and signs, water and emulsion, and the other for premix material. A better patch can be placed with less difficulty if fresh premix material that has not been stockpiled very long is used. Where possible, we use the same personnel on patching crews. They learn to work together as a team and take a great deal of pride in their work.

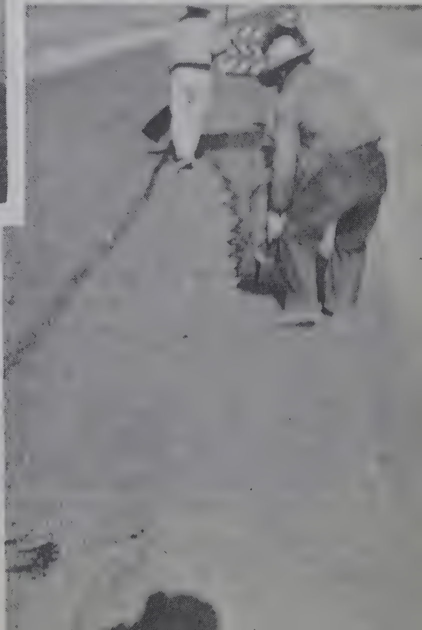
Low spots will be found ten to twenty feet behind the lime marks. These marks will stay on the surface three to four hours.

String lining and marking contour of depressions which have been marked.





Patching has been completed on left of center line, and depressions marked and ready for emulsion tack coat on right of center line.



Diluted emulsion tack coat is poured and broomed over the surface. Note the wire line stretched to preserve permanent edge alignment.

Tack coat ready for premix.

The premix is placed and spread over the tacked area. A float is used for finishing and a maintenance roller provides compaction.

This view shows sequence of work on right half of pavement and finished patches on the left.

EXTENDING CONCRETE CULVERTS

Roy Johnston, Senior Maintenance Superintendent

District 19

It has long been recognized that extending and re-extending concrete culverts is a major problem and is the cause of much delay as well as cost in the expansion of our highway system.

Back in 1937 the section of road on Highway 47 (now U.S. 59) from Atlanta toward Linden for a distance of five miles had a 24-foot crown and was paved on one side with a strip of concrete nine feet wide. At that time, a contract was awarded to widen the strip of concrete to twenty feet, and the culverts were widened to conform to a 34-foot crown or to a minimum width of 42 feet. Since that time a part of this section in and adjacent to the City of Atlanta has been improved and constructed to modern standards.

On our current state program, we included a project for placing twelve-foot paved shoulders to secure a 24-foot pavement with 10-foot surfaced shoulders on the remaining three and one-half miles of this five-mile section. This project was to be done with our own forces. We were then confronted with re-extending some of the structures on this section of road.

The structures to be extended consisted of five small 3-by-2's of the C-7 and BC1W2 type, one of which was on a 45 degree skew, one 3-by-3, one 5-by-5, and one 8-by-5 C-7.

The usual method for breaking off the headwalls and aprons, disposing of the old concrete, and constructing new barrel extensions, wings, and aprons would have required 38.5 cubic yards of concrete and 3,311 pounds of reinforcing steel. Also it would have been a slow and expensive job for the quantities involved. After consultation with our Construction Foreman, it was decided to cut these structures in two, slide the wing and headwalls out and extend the barrel only. No difficulty was encountered in extending the smaller structures on the upstream end as the first structure extended had turned-up toe walls. This was accomplished by cutting the old structure, preparing the subgrade, and sliding the structure out with the use of jacks and a winch truck. On the downstream end of the first structure, difficulty was encountered in raising the wings to remove the toe wall. In order to get away from the problem, it was decided to excavate the footing to the depth of the toe wall, slide the structure out, and then tamp the backfill material back under the structure by means of a jack hammer. This was possible because of the narrow width of the culverts. It is also practical to remove the toe wall, bend up the steel, move, dig new trench, and pour new toe wall.

The 8-by-5 and 5-by-5 structures were moved by the use of jacks and two winch trucks. After the wingwalls and headwalls had been moved to their new position, all steel was placed prior to the placement of forms. Forms were placed only on the outside and inside of the walls and the bottom of the top slab. This allowed the placement of footing, wall, and top slab to be monolithic.

It is difficult to say how much was saved by this procedure. We spent $2,900 and used 20 1/2 cubic yards of concrete instead of 38 1/2. We certainly saved time as this was a rapid process. It is evident that we saved materials. On our next similar job we can save more money.

If the work had been done in the usual manner and we could have placed the 3,311 pounds of reinforcing steel for 12 cents per pound, the 38 1/2 cubic yards of concrete would have had to be placed for about $65 per cubic yard to make that method competitive. Since this price would have to include removing and disposing of the old concrete and all excavation, which in this case was heavy, I don't believe we could have done it for less than $100 or $125.

Even if no money at all was saved, the saving in time would make this method worth trying.

The barrel is cut by first drilling a line of holes with a pneumatic drill and then completing the cut with the pavement breaker.

The barrel has been cut and the culvert end is ready to be moved to new position. The steel bars may be cut with a hacksaw or torch.

Jacks and two winch trucks were used to move the culvert end to its new position. On smaller culverts, only one winch truck is needed.

The culvert end has been moved out and is ready for construction of the barrel section.

Longitudinal bars are cut to length and lap-welded to the stubs.

The forms are in place, and final steel ties are being completed.

Forms consist of inner and outer side forms, made in sections, and bottom form for top slab. This enables the entire barrel section to be placed in one pour.

Vacation & Sick Leave FORM

Disa Marie Nelson, District Bookkeeper
District 20

For some time the District Accounting Office has felt a need for a form to furnish employees in the field with accurate information on the status of vacation and sick leave. In the past, there has been confusion on the part of the supervisors concerning the amount each employee had taken and the amount he had left, which resulted in some disappointment to employees when they found that they had requested more vacation than they were due.

After some study of the problem, the attached form was devised by Harry Gray, Chief District Accountant, and Disa Marie Nelson, District Bookkeeper. It is prepared in duplicate in the field, at which time only the first three lines are filled in and the form is signed by the employee and by his supervisor. It is sent to the District Office, posted to Form 483-B. The bottom part of the form is completed, approved, and one copy is returned to the supervisor and one copy retained for the District Office files.

Since we have been using this form we have had very little difficulty in this matter of vacation and sick leave.

To go a step further, we have requested that time slips be prepared and attached to cover the leave requested. These time slips are checked against the request as to dates and time shown, and are okayed. At the end of the payroll period, the time slips are checked and if any show vacation or sick leave that has not been okayed, we ask the supervisor to submit a form requesting the leave. We are, thereby, certain that all time taken for vacation or sick leave is on the record, eliminating the possibility of an employee being off and forgetting to turn in a request.

REQUEST FOR APPROVAL OF ABSENCE FROM DUTY

Date ____________ Print Name ____________________
I respectfully request approval covering absence from duty for the period from:

____________ 19___ through ____________ 19___ total _____ hours

account of ________________________ Charge to: VACATION / SICK LEAVE

Approved by: ____
Engineer or Foreman   Signature of Employee

For District Office use only:
After this leave has been posted, the District Office records indicate the following:

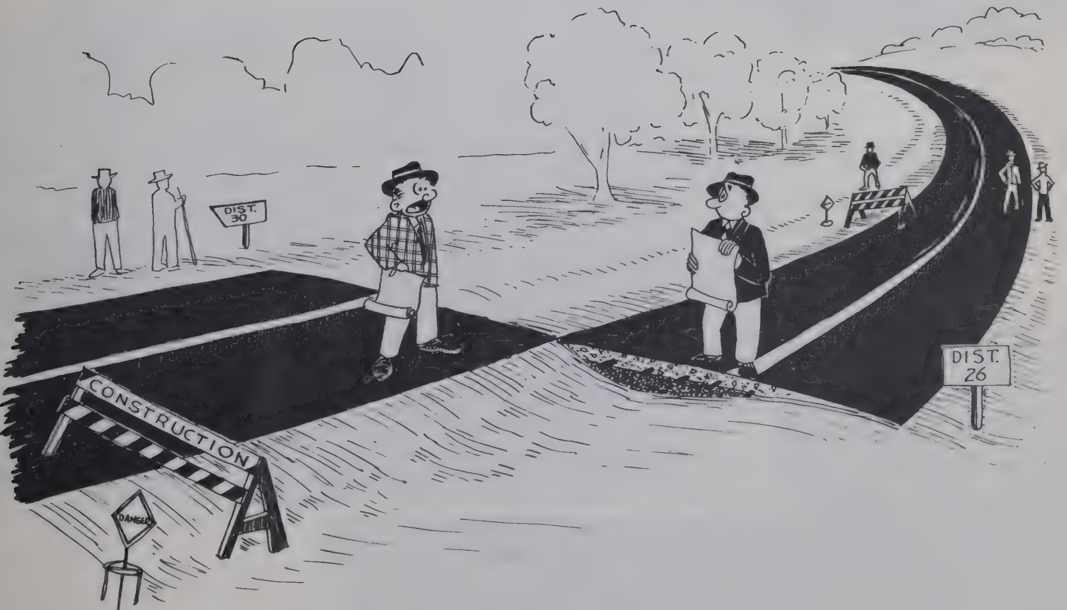
FROM LAST YEAR	CURRENT YEAR
Vacation-Amount Forward _____ Hours	Vacation-Amount Used _________ Hours
Vacation-Amount Taken _____ Hours	Sick Leave-Amount Used _________ Hours
Vacation-Amount Unused _____ Hours (On next Aug. 31, any unused portion of above balance will be cancelled)	

The above request OK by: Granted by:

____
Chief District Accountant   Assistant District Engineer

Instructions: Two copies of this form are to be sent to the District Office. One copy will be returned to originating supervisor, approved or disapproved.

◆ ◆ ◆



"Compromise nothing I'll not move a pebble till I hear from headquarters!"

Wetting Aggregate With Kerosene – Simplified

J.C. Roberts, District Engineer
District 8

The principal of wetting aggregate with kerosene to embed it in old asphalt surface was first worked out by Joe Bruton, as described in the original article. However, since the spreader box and spray bar arrangement was rather awkward and cumbersome to use on the highway, a method was devised by Cecil Conklin, Senior Maintenance Foreman at Abilene, which greatly simplified the application of the kerosene. This method used the usual asphalt pot equipment and a garden hose to spray the aggregate as it was being loaded into the truck. It was found to be equally effective with the experiments first used in Callahan County.

More On
"SLICK WHEN WET"

COMMISSION
E. H. THORNTON, JR., CHAIRMAN
FRED A. WEMPLE
ROBT. J. POTTS

TEXAS HIGHWAY DEPARTMENT

STATE HIGHWAY ENGINEER
D. C. GREER

Abilene, Texas
14 April 1953

FILE NO.

Mr. G. F. Hellesoe
Maintenance Engineer
Division of Highways
Department of Public Works
P.O. Box 1499
Sacramento 7, California

Dear Mr. Hellesoe:

We have a copy of your letter of April 6, 1953 addressed to Mr. J.A. Waller, Chief Engineer of Construction and Maintenance, in which you request additional information concerning a recent article appearing in our Bulletin No. 21 entitled "Slick When Wet."

The following information is submitted in reply to your request: The surface referred to in the article was a one course surface treatment consisting of a single application of OA 135 asphalt (.4 gallon per square yard) covered with our Grade 3 aggregate (1 cubic yard per 85 square yards). This highway carries approximately 3,000 vehicles per day, and after being in place 3 years, the asphalt in the surface flushed to the top in those areas where the majority of the traffic travels. This created a slippery condition during wet weather, along an area about 8 feet wide on each side of the 36 foot pavement, the remainder of which was in good condition. An attempt was made to embed aggregate in the asphalt during the hot summer season, but without results since the asphalt exposed had apparently become too weathered to retain additional aggregate.

The procedure described in the article used the principle of saturating the Grade 8 crushed aggregate with kerosene prior to placing an extremely small amount (approximately 1 cubic yard per 2,000 square yards) on intermittent slick areas. The thought here was that complete coverage of the surface with a new course of aggregate was not the result we were attempting, and that by saturating the aggregate, the kerosene would reach only those places at which we were attempting to embed a particle of aggregate, leaving the areas of the surface between the particles untreated.

The aggregate was allowed to remain a few minutes after being scattered on the pavement in this "salt and pepper" manner and then rolled with a 6 ton flat wheeled roller.

On this job we used the usual aggregate spreaderbox which was equipped with a spraybar under pressure to provide the kerosene treatment. This equipment proved to be awkward and cumbersome in use and on our later jobs we have simplified the operation with equal results by attaching a garden hose and nozzle to an asphalt pump on our normal maintenance equipment, and spraying the aggregate with kerosene at the stockpile as it was slowly dropped from the bucket of a front end loader into the truck. Trucks were equipped with the new type spreader which attached in place of the usual end gate on the truck.

Following are our grading requirements for the aggregates mentioned above:

Grade 3 (Used in original pavement)
Retained on 3/4" screen - 0%
Retained on 1/2" screen - 25 - 50%
Retained on 10 mesh sieve - 97 - 100%

Grade 8 (Used with kerosene for non-skid effect)
Retained on 1/2" screen - 0%
Retained on 3/8" screen - 0 - 10%
Retained on 10 mesh sieve - 97 - 100%

Our experience with this method indicates that favorable results may be obtained where a penetration surface has become slick due to the asphalt "bleeding" to the top in sufficient amounts to allow the new aggregate to become embedded and, with the action of the kerosene on the asphalt, retained.

We hope that the above information may be of some benefit to your Department in the event you have a similar asphalt surface needing the non-skid treatment. If we can be of further service, please call on us.

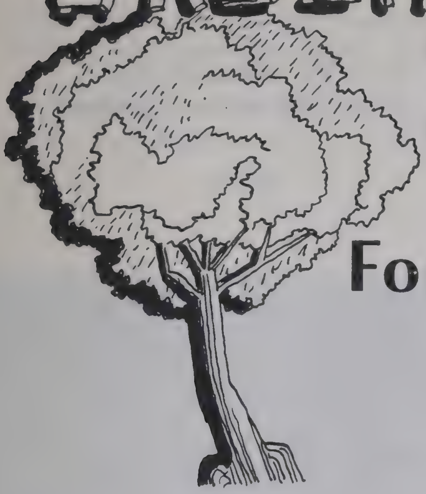
Sincerely yours,

J.C. Roberts
District Engineer

JCR-o

cc: J.A. Waller - Chief Engineer
Construction and Maintenance

BRUSH CLEARING



For Sight Distance

C.W. Batchelor, Senior Maintenance Foreman
District 22

We have just completed clearing the brush inside a curve on U.S. 277 about two miles south of Quemado. As will be noticed from the "before" and "after" pictures of this curve, we have increased the sight distance from approximately 700 feet to over 1,200 feet.

Since first instructed to clear all curves with brush obstructing a driver's vision in District 22, we have possibly eliminated as much as three miles of auxiliary dash stripe in Maverick and Kinney counties. Besides the safety factor involved in this type work, we save several hundred dollars yearly by not having to repaint the yellow dash stripe no longer needed.

We have done some brush clearing inside curves that still fails to secure the maximum sight distance required to eliminate the auxiliary stripe because of buildings, side hill cuts, and such. In such cases we still save some stripe and at the same time give the motorist a few more feet of clear vision ahead.

When clearing requires that we go outside the right of way, we obtain the adjacent property owner's signature on a form letter that permits us to clear the brush on his property. This form also states that all brush, cut or grubbed, will be removed from the property, that no fires will be started, that the area and fence will be left in a satisfactory condition, and that the authority granted is for the one instance only.

We have found that by treating the stumps of the brush with kerosene or diesel fuel, new growth is retarded a great deal, and additional clearing will not be necessary for several years. This is especially true of mesquite brush, as it has to be cleared almost yearly without treatment of some kind.

There is no way to determine how many accidents we have prevented, or will prevent in the future, by increasing the sight distance on our curves, but we certainly do know that an accident cannot be blamed on the Department for lack of vision ahead. We can also have the satisfaction of knowing that for each foot of stripe eliminated, we are saving a little more money, which will add up to a considerable amount over a period of years.

U.S. 277, Maverick County
Three miles north of Quemado.

Before

U.S. 277, Maverick County
Three miles north of Quemado.

After

U.S. 277, Dimmit County
Nine miles northwest of Carrizo Springs.

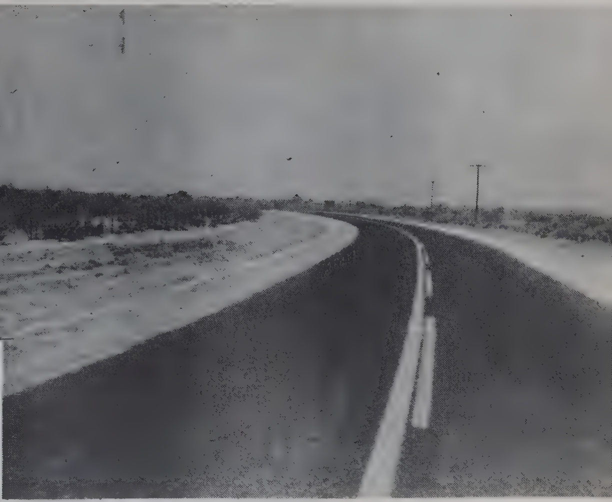
Before

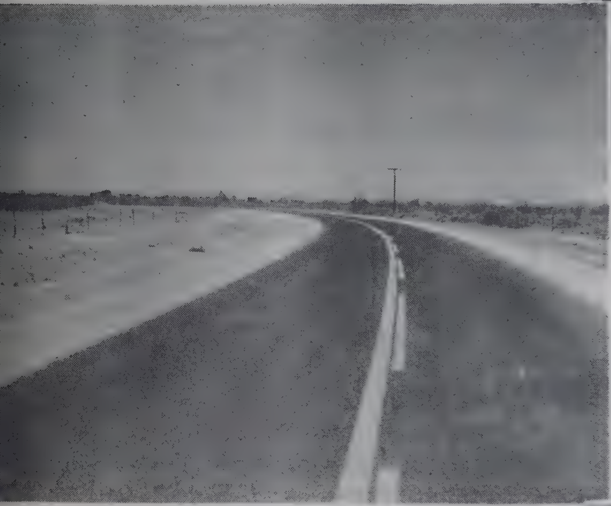
U.S. 277, Dimmit County
Nine miles northwest of Carrizo Springs.

After

State Highway 76, Zavala County
Sixteen miles west of La Pryor.

Before



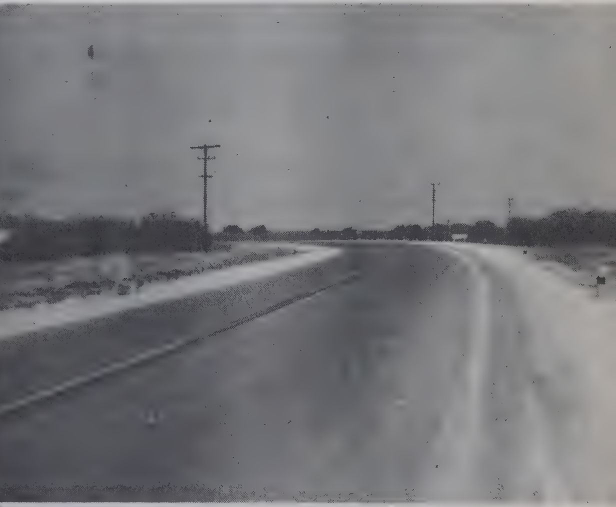


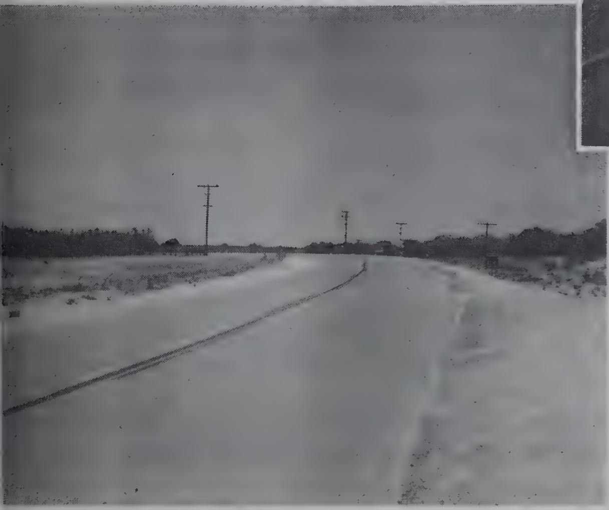
State Highway 76, Zavala County
Sixteen miles west of La Pryor.

After

State Highway 85, Dimmit County
One mile east of Carrizo Springs.

Before





State Highway 85, Dimmit County
One mile east of Carrizo Springs.

After

Review On Selection Of Structure Sizes

B.E. Schweers, Associate Office Engineer
District 13

As a review of the basic principles involved in determining the size opening required for small drainage structures, and to improve uniformity in the use of the "Rational Design of Culverts and Bridges" manual, District 13 undertook a training program for the engineering personnel of the District in the use of the manual and the proper procedure to follow in the selection of structures, using the Rational Design of Structures Computation Sheets.

A set of three typical drainage problems was prepared in the District Office and copies were sent to the residencies for each of the men, who determine the size of structures, to work out separately and submit their results to the District Office.

The first problem consisted of a sketch of a typical drainage area with the area, slope, length, coefficient of runoff, type of soil, design frequency, and county given for the drainage area. Also shown was the proposed constructed outfall ditch with its slope and coefficient of roughness given, and the proposed flow line and elevation of top of pavement. This problem was set up for a submerged flow condition.

The second problem consisted of a sketch of a drainage area with a fairly deep drain ditch running through the middle of it. Elevations were shown at points around the drainage area and on the drain ditch. The scale, design frequency, description of vegetation, type of soil, type of vegetation in the drain ditch, and the county were given. Also shown was a typical drain ditch section above and below the proposed structure site with the scale given, and the proposed flow line and elevation of top of pavement. This problem was set up to design for a drainage area having both overland and channel flow.

The third problem consisted of a sketch of a drainage area with all the pertinent information given to obtain the discharge. Also shown was a typical existing outfall ditch that was rather wide and flat, giving the scale, type of vegetation, and slope of the ditch. This problem was set up to design for a free outlet.

A set of the three problems was also sent to the Bridge Division in Austin with the request that a representative of that office work them and, after all the information from the residencies had been received in the District Office, have the representative meet with the personnel of this District who had participated in the program and discuss any problem that had caused them trouble in working these problems.

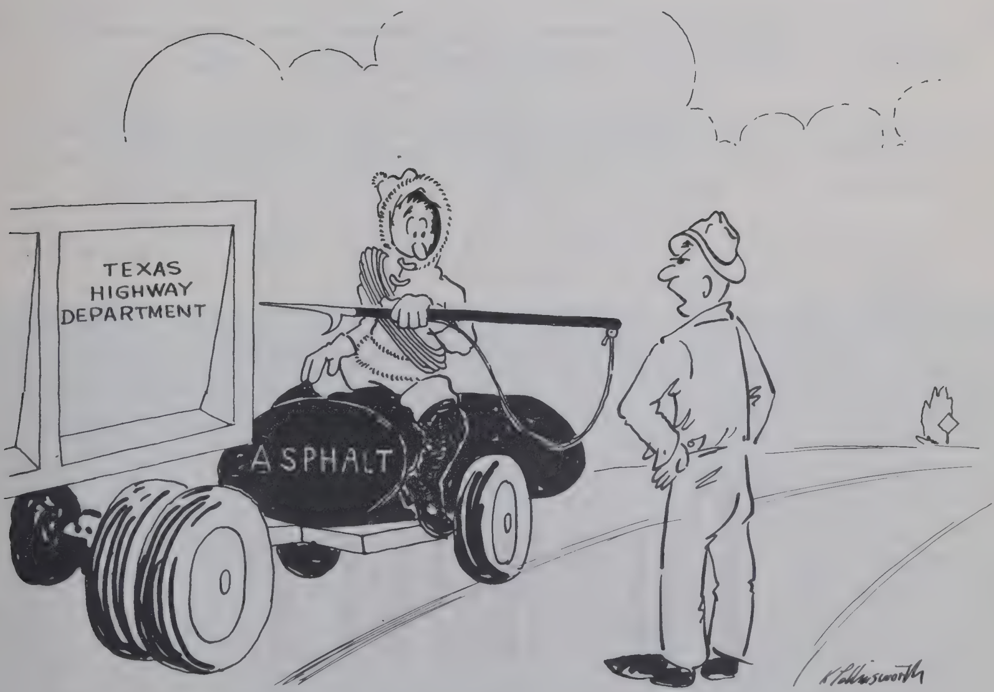
As the results were submitted, a tabulation was made in the District Office showing the value of each hydraulic datum versus the different men that worked the problems. The results were fairly uniform for the discharge and size of opening, but varied some on the type of structures to install to obtain the required size of opening. Problem two had the widest range of results due to some of the men calculating the discharge as all overland flow, and others showing it as overland and channel flow.

On May 4, 1953, the meeting was held in Yoakum with 27 men of the District attending and two representatives of the Bridge Division from Austin. M. G. Cornelius, District Engineer, opened the meeting by welcoming the men from the District and introduced R. S. Guinn, Senior Field Engineer, and E. J. von Rosenberg, Hydraulic Engineer, from the Bridge Division.

The set of three problems that the men in the District worked were handed back to them so they could compare their answers with those obtained by the Bridge Division. The problems were then worked out in detail by von Rosenberg with comments added by Guinn. The results obtained by the Bridge Division were structures of a larger size than most of those obtained by the men in the District, due to the Bridge Division limiting the backwater head to a smaller value than those obtained by the men in the District.

The interest and full participation of those attending contributed materially to the value of the school. It is hoped that the program will be instrumental in helping the men of the District in the solution of their small drainage structures.

* * *



"Elrod, are you sure you understood correctly when I said we were going to do some sealing today?"

Personnel

H.L. Arno, Director of Personnel

1. District 15, Expressway, San Antonio: W. Kirk Pipkin, Senior Designing Engineer, resigned June 22, 1953.

2. Dallas Urban Project: Frank S. Craig changed from Designing Engineer to Senior Designing Engineer July 1, 1953.

3. Fort Worth Urban Project: Joe M. Bingham changed from Resident Engineer to Senior Resident Engineer July 1, 1953.

4. District 15, Expressway, San Antonio: Frank S. Walters changed from Designing Engineer to Senior Designing Engineer July 1, 1953.

5. Construction Division, Austin: W.L. Garrard changed from Office Engineer to Senior Construction Engineer July 1, 1953.

6. District 12, District Headquarters, Houston: George P. Munson Jr., reappointed July 1, 1953, as District Maintenance Engineer, after service in U.S. Army.

7. Construction Division, Austin: E.R. Gunter, Senior Construction Engineer, retired July 31, 1953.

Turnover

Revised

Asphalt Surface Treatment Form

The following form for reporting tests made in design of penetration surfaces is a revision of the one presented in C & M Number 22 in an article by Gilbert A. Youngs on Penetration Surfaces.

The form has been made a little clearer and provisions made for square yard test board method.

ASPHALT SURFACE TREATMENT

Cover Stone Spread Ratio and Asphalt Rate Computations

Project:__________________. Hwy.____________. ________________County

Sample No.________________Sp Gr________. Unit Wt._____lbs/cf,____lbs/CY____%Void

Type A B, Grade____. Reps.______CY. Stockpile______________________________.

Percent Retained On   Percent Passing

Sizes 1   7/8   3/4   5/8   1/2   3/8   1/4   #10   #20   #10   #20

Specification Accumulative Gradation
Percent
Average Accumulative Gradation
Percent

Calculations For Average Particle Sizes of Aggregate and Effective Mat Thickness

Sizes	Weight		Percent	times	Average	Size
1-7/8	__________	=	__________%	x	15/16 =	__________/16
7/8-3/4	__________	=	__________%	x	13/16 =	__________/16
3/4-5/8	__________	=	__________%	x	11/16 =	__________/16
5/8-1/2	__________	=	__________%	x	9/16 =	__________/16
1/2-3/8	__________	=	__________%	x	7/16 =	__________/16
3/8-1/4	__________	=	__________%	x	5/16 =	__________/16
1/4-#10	__________	=	__________%	x	3/16 =	__________/16
-#10	__________	=	__________%	x	1/16 =	__________/16
Total			100.0%	x		/16 x 2 = /32 = (T/32)

"T" being the average size of aggregate particles and also the Theoretical Mat Thickness for one stone cover expressed in 32nds of an inch.

Aggregate Spread Ratio 1152 ÷ T = 1152 = 1 CY to __________SY.

Percent Embedment = T + 18 = ______+ 18 = __________.

Asphalt Rate = T x $\frac{\%\ \text{Emb}}{100}$ x $\frac{\%\ \text{Voids}}{100}$ x 0.175 = Gallons per Square Yard

= __________x__________x______x 0.175 = __________Gal/SY.

SQUARE YARD BOARD TEST

Weight on board (W) = ________lbs. Spread Ratio (S) = $\frac{\text{lbs/CY}}{W}$ = ______=______SY/CY

T = $\frac{1152}{S}$ = 1152 = ______________.

Asphalt Rate = _____x_____x_____x 0.175 = ______________Gal/SY.

DISPLACEMENT PILES

Fred W. Clark Jr., Senior Resident Engineer
District 22

Selecting the proper type of bridge foundation is an ever-present problem in designing and constructing a new bridge. This problem, to a large extent, has been solved by proper coordination and organization within the Department by making thorough preliminary investigation of the subsoil, using a core drill and penetrometer test, and triaxial test if desired, the stratum upon which a bridge footing is to rest can be accurately determined in most cases.

After the determination of the subsoil conditions has been made, the selection of the type of footing to be used may still be controversial due to other factors such as stream velocities encountered by normal flow and high water, accessibility, and of course the type of superstructure to be supported. On Project C-878 - 5-7, Nueces River Bridge, F. M. Highway 395 in Zavala County, the preliminary investigation indicated a very soft unstable soil extended to approximately 40 feet below the ground line of the natural channel. To obtain adequate bearing, it was necessary to use long lengths of foundation piles extending up to the ground line where they were to be capped to support circular column bents. In addition to using 40-, 46-, and 52-foot lengths of foundation piles for bearing, it was further proposed to batter the piling for lateral stability.

In consideration of the conditions and peculiarities of the bridge site, it was proposed that "displacement piling" be used. The type pile selected being three-sixteenths-inch gauge steel pipe piling, to be driven and then filled with concrete, placing the reinforcing steel in the top six feet only.

The steel pipe proposed was a fourteen-inch diameter spiral-welded wrought steel pipe used widely in many other industrial uses. Several different types of pilot points were proposed; however, the point finally approved was a simple flat bottom consisting of a three-fourths-inch steel plate welded on the fourteen-inch diameter steel shell supported by a backing ring as shown in Figure 1.

The purpose of this report is to give points of interest in the installation of steel pipe piling as compared to other type piling, as well as driving conditions experienced on the above-mentioned project.

Schwope Brothers, of San Antonio, was general contractor on this project and completed the work on March 25, 1953.

Inasmuch as the steel pipe piling weighs considerably less than concrete piling, the problem of handling long lengths of piles is greatly reduced. Point of pickup can be ignored, provided steel cable bridges are used. However, in no case should steel hooks or chain "pickups" be used.

Storing of steel pipes should be on level ground, making reasonable allowances to prevent crushing. Sin-

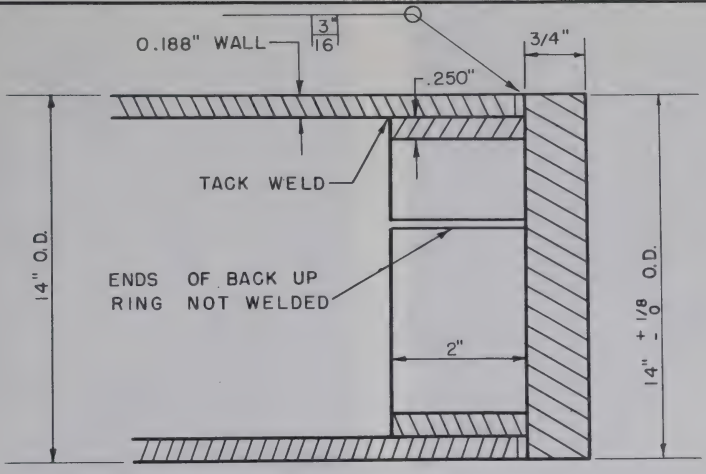


FIGURE NO. 1

gle lengths of steel pipe may be stored at random without regard to supports or danger of breaking.

Pictures 1 and 2 show the end views of the fourteen-inch diameter steel pipe, as well as the spiral weld. The bottom view as shown is the same as Figure 1 described above.

Where it is desirable to use long lengths of displacement piling extending through unstable and variable subsoil conditions, it is desirable to have adequate pilot holes, to develop the required penetration, and to hold piling in correct alignment either straight or on a batter.

Inasmuch as the piling on this project were battered two inches to twelve inches, it was necessary to drill each pilot hole on the required batter. Picture 3 shows a rotary drill in operation preparing the pilot hole.

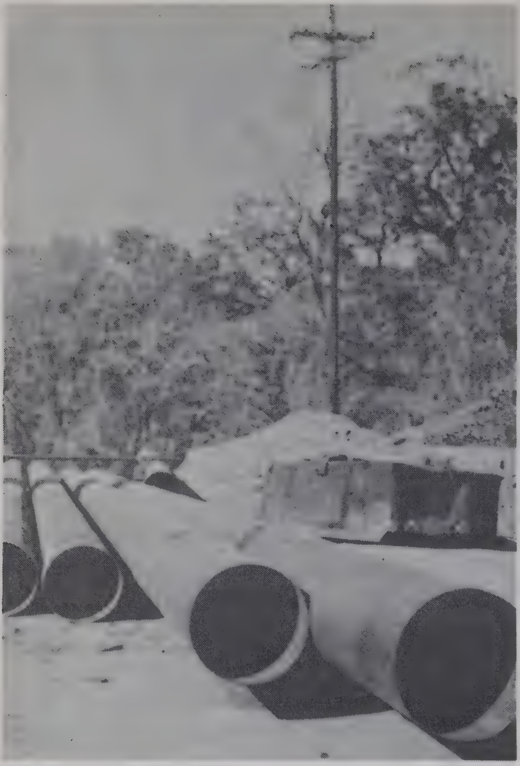
Picture 4 shows the piling placed in the pilot hole with the pile driver in position to drive.

To find out how much this type of piling could be driven without damaging the driving rim of the pile was of special interest. Picture 5 shows the special head used to fit over the end of the pipe. Picture 6 shows a pile in place with no damage to the rim, which was the case with all piles on this project. Some of the piles were driven to a resistance of 70 tons each withstanding hard driving for over 1,000 blows, with no damage whatever to the rim of pile.

Picture 7 shows the piling in place filled with concrete and ready to be capped.

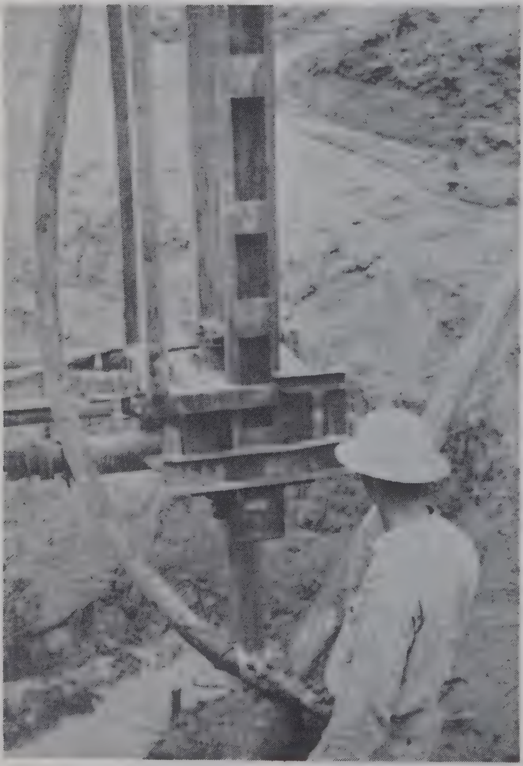
Another advantage of steel pipe type displacement pile is that "cut-offs" and "build-ups" require little time, and can easily be made with a standard cutting torch and electric welder.

In summary it might be said that the installation most suited for steel pipe displacement piles would be projects having a design requirement for long length displacement piles. For other projects they should be considered as an alternate depending entirely on the comparative cost for the particular project. In any case where time is a factor in construction, pipe piling can be used to a definite time advantage, regardless of the length of displacement pile required or type of soil encountered.



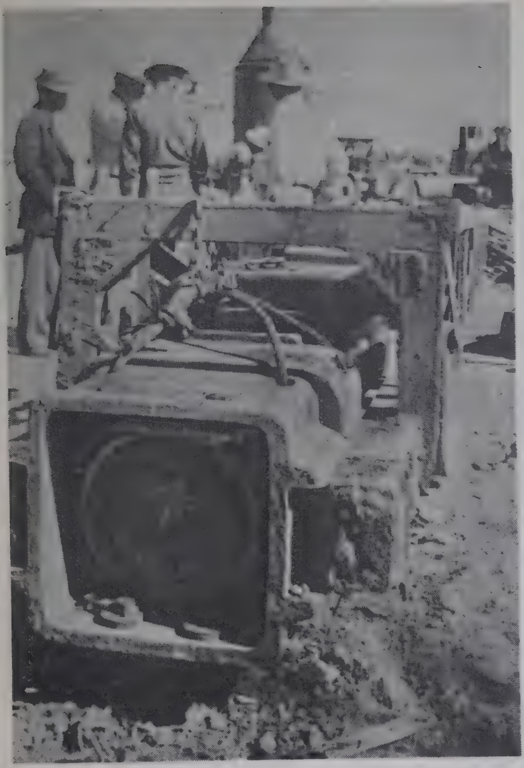
Picture 1

Picture 2

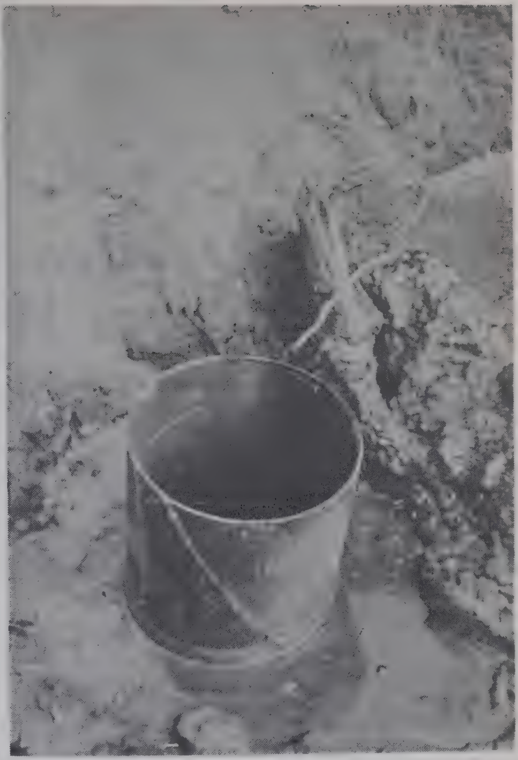


Picture 3

Picture 4



Picture 5



Picture 6

Picture 7

Use Of The Ottawa Hydra Hammer In Patching Concrete Pavement

J.W. Cravens, District Maintenance Engineer
District 1

During May, June, and July an Ottawa Hydra Hammer was used on concrete pavement patching work on a lease basis on U. S. 82 in Grayson County.

The Hydra Hammer was leased at a rate of $4 per hour for the time the machine was used. The price included fuel, oil, repairs, and an operator. The work was organized so that the Hydra Hammer was kept busy the entire day.

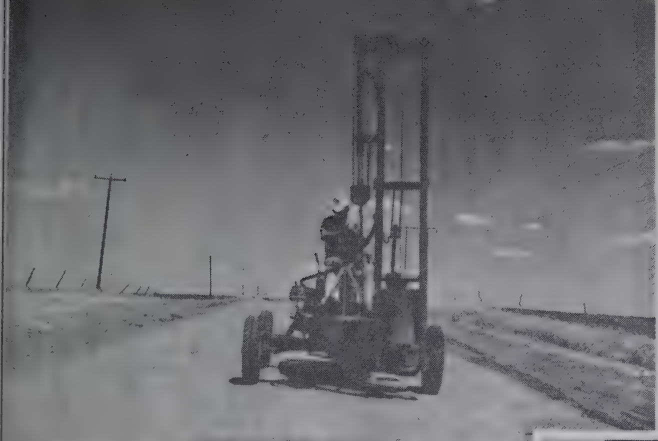
The Hydra Hammer proved to be a very effective pavement breaker for patching small failures in concrete pavement. Being a small, self-propelled, and readily maneuverable unit, it is well adapted to working under heavy traffic.

The patching operation consisted of breaking up and removing small failed areas of concrete pavement and replacing with a mixture cement-treated flexible base. After removing the concrete, the subgrade was dug out to a depth of twelve inches below the surface of the concrete. Cement-treated flexible base was tamped to within one inch of the surface. A one-inch layer of cold mix asphalt concrete was used to bring the patch up to grade. The cement-treated flexible base consisted of crushed stone of flexible base gradation with three sacks of cement per compacted cubic yard. Enough water was added to give a damp condition.

All areas that were dug out were patched and opened to traffic the same day they were dug out. This method of patching has been used with good results in Grayson County since 1941 when failures began showing up due to increased heavy loads.

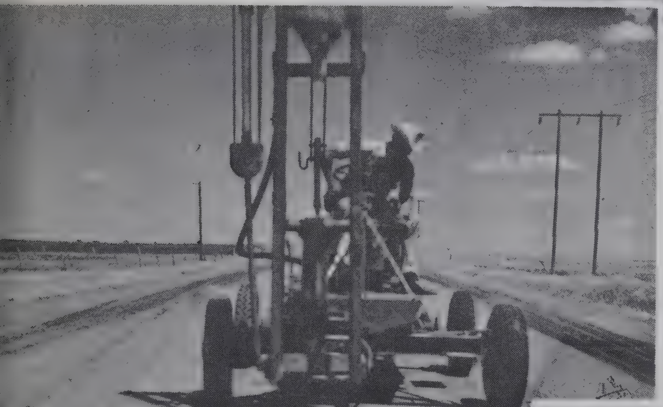
During May, June, and July on U. S. 82 from Sherman to Whitesboro, 1, 635 square yards of patches were placed at a cost of $7. 60 per square yard. This included removing the old pavement and placing the patch of cement treated flexible base and cold mix asphaltic concrete.

From January, 1952, through July, 1952, in Hopkins County, concrete pavement repairs similar to those in Grayson County were being made on U. S. 67 from Sulphur Springs to the Hopkins-Franklin County Line. On the Hopkins County work, the failed pavement was broken up by the use of an air compressor and hand-operated pavement breakers. During this period of time, 1, 400 square yards of patching were placed at a cost of $11. 73 per square yard.



Hydra Hammer being moved to area of failing concrete.

Side view of pavement-breaking operation.



Operation of breaking up failed area in concrete pavement.

Failed area of concrete, broken up and ready for removal.

PIPE STRAIGHTENER
FOR CITY SIGN PIPE

Alton Vordenbaum, Maintenance Superintendent
District 15

It has always been a problem to maintain city sign pipe on account of damage by vehicles. When the pipe is hit, it usually bends close to the ground. Then the bent section has to be removed and replaced with a new one and the old one straightened at the shop. This necessitates removing and replacing all the signs as well as the pipe.

J. L. Copenhaver, Maintenance Foreman at San Antonio, is now using a pipe straightener designed from one being used by the City of San Antonio, and built in the District 15 Shop. It will straighten pipe up to two inches in diameter. If the pipe has been actually kinked, it cannot be straightened by this method. For this tool to have the necessary leverage, the pipe must at least have concrete poured around it, even though it may be set in the ground, as most city signs are.

This tool has saved considerable time and expense.

The following materials are required to build the pipe straightener:

(1) 2" x 42" galvanized pipe with a 5" x 3" shoe welded on one end to rest on the ground and an eye welded adjacent to it to accommodate the chain. Also, a 1/2" x 2 1/2" x 6 1/2" handle welded to pipe near jack for carrying the tool.
(2) 3/8" x 7' chain.
(3) 1/2" x 3 1/2" x 5 1/2" steel plate welded on other end of pipe to hold base of five-ton hydraulic jack.
(4) Four 3/8" machine bolts to fasten base of jack to steel plate.
(5) One five-ton hydraulic jack.
(6) Two 3/4" x 3" x 4" steel clamps with two rounded corners to clamp over end of jack lifting device.
(7) Two 3/8" x 3" machine bolts through clamps at jack lifting device.
(8) One 5/8" x 4" bolt through center clamps.
(9) One 5/8" x 4" bolt with key to hold half round section of pipe shoe to fit over pipe to be straightened.
(10) One half round pipe shoe to fit over pipe to be straightened with 3/4" steel eye welded on to fasten between clamps, and for 5/8" bolt key to go through.

"Comments From the Traveling Public"

OVER THE HIGHWAYS

For the past couple of months Texas Highway --- from the --- County Line to --- has been under construction or repair.

We have had three periods during which the rain put the detours in an impassable condition. A much better detour could have been provided.

Today, as in many of the days in the past two months, it is dry and still the detours are in such poor condition that many cars have to be pulled through. The contractors and/or workmen on the job have directed traffic into a lane which was impassable, forcing cars to be reversed for as much as one-half mile. In several instances there have not been proper signs, lights, and safety precautions taken.

We respectfully request that you investigate the matter and see that conditions are bettered.

(Signed)

We have just returned from a trip to El Paso. Going to El Paso we visited Alpine and Marfa and on the return trip we took time to visit Ft. Davis, the Davis Mountains and drove over the Scenic Loop.

We enjoyed every mile of our trip, the fine highways, the many shade trees that were pruned and the shade looked inviting whether we stopped or not, and in particular the many miles of clean right of way. Little did I realize that Texas had such scenic beauty as it has in the Marfa, Alpine, and Davis Mountains area. I think that it should be brought to the attention of more people through some medium of advertising.

What prompts me to write this letter most is the roadside parks that seemed to be "scattered" just right. Although we did not stop at all of them, they were there, all cleaned up and inviting people to stop for a while. The arbors were the first that I had seen and they are pleasing to the eye and refreshing as a cool drink of water. All the stopping places, arbors and parks, seemed to fit the surrounding country rather than looking as if they had fallen off of a passing truck.

Just had to take a few minutes off to compliment the Texas Highway Department on the fine job that they are doing.

J. Luther Haynes
Brownwood, Texas

. . . My copy of the state highway map, which I have used since about 1935 is suffering from old age - in many ways. If consistent with your rules, I would appreciate a new copy, but will not (at 90) promise to use it as long as the last!

Thankfully yours,

J. F. Rall
Cedar Rapids, Iowa

. . . We got a thrill out of the attractive planting by the culverts along your roads, the yuccas, palms, trimmed hedges, holly and pine trees - all so beautiful and so well kept.

Our drive through Texas was thoroughly enjoyed and was one of the brightest spots of a wonderful trip from Philadelphia, Pennsylvania, to Phoenix, Arizona, and return.

We thank you, Sirs, and we salute the Highway Department of the great state of Texas.

Mr. and Mrs. G. Earl Smith
Philadelphia, Pennsylvania

. . . Just a word of thanks for providing such lovely roadside parks in our state.

We enjoyed their conveniences on our recent vacation and wanted to express our appreciation to you for helping us in this way to an enjoyable and economical vacation. Thank you.

Joe and Gloria Sweeney
San Antonio, Texas

. . . I would appreciate it if you could forward to me information concerning the State of Texas' views toward skating on the highways of your state.

I am gathering information from several states (and so far the reports have not been unfavorable) in order to weigh the possibility of a cross-country trek on roller skates -- from New York to Los Angeles. The proposed course of travel in Texas would entail traversing Route 66.

The passage would occur during the daylight hours (between six a. m. and six p. m.), and the skater would be accompanied by a pace automobile. Any precautionary measures deemed necessary would be taken -- such as warning flags, etc.

Thanking you in advance for your consideration and prompt reply.

Signed

MISCELLANEOUS COMMENTS . . .

. . . All along the highways was littered with beer cans, milk cartons, and strewn with things people discarded. Looks like a dump ground . . .

Mr. and Mrs. Lester Murr
Webb, Iowa

. . . It seems to me that Texans never get in a hurry or become impolite until they get behind the steering wheel -- Boy! what a difference an automobile makes . . .

Branford, Florida

. . . Your picnic parks were helpful accommodations . . .

Detroit, Michigan

. . . You have fine system of roadside parks . . .

Muskegon, Michigan

. . . Highway markers showed distances between small towns. Would like some showing distances to main cities . . .

Palo Alto, California

. . . Some of the highways through towns could be marked better . . .

K. G. Smith
Regina, Canada

. . . Not enough roadside parks . . .

Pensacola, Florida